Chemical Process Technologies for Simultaneous NO_x Removal in Existing FGD Installations

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Higher NO_x Efficiency Desirable

- Due to
  - SCR system inadequacies
  - Ambient ozone and PM 2.5 standards
  - Allowance banking
  - Future prevalence of scrubbers

Oxidation/Reduction Experience

- Japanese ozone and sulfite scrubber
- Wet ammonia
- Wet magnesium buffered lime
- Dry scrubber and magnesium hydroxide

Oxidation - Absorption

- DeSNO$_x$ with Lextran
- BOC LOTOX
- MHI wet catalytic absorption with iodine
- Side benefit – mercury oxidation

Asian SCR by Country

Country	Capacity (MW)
China	3,600
Japan	24,603
Korea	4,100
Taiwan	6,820
TOTAL	39,123

Asian SCR

- Physical Details
  - Some high S experience, but at 55% efficiency and 10 pitch
  - Most low S with Australia, South Africa coals
- Performance
  - 1 ppm ammonia slip
  - 20 years, few problems

European SCR by Country

Country	Capacity (MW)
Austria	1,575
Belgium	unknown
Denmark	1,911
Finland	560
Germany	32,783
Italy	4,120
Netherlands	983
Russia	240
Sweden	400
TOTAL	**42,572**

European SCR: Physical Details

- High dust 24 GW; Tail-end 18 GW
- Limits are 200 mg/Nm^3 (0.16 lbs/mmBtu)
- High dust-dry bottom; Tail-end-wet bottom
- Historically S = 0.7 – 1.3%
- Now 55% German coal is imported

European SCR: Performance

- $SO_2 – SO_3$: 0.1 – 1.5% in boiler
- $SO_2 – SO_3$: 0.1 – 4.5% in total
- 5 ppm ammonia slip affects ash sale
- High sulfur coal is high ash
- Low efficiency requirements due to LNB

Remedies

- High ash sorbs SO_3
- Arsenic poisoning reduced by 1 – 3% limestone
- Flow optimization
- Increase catalyst pitch from 7 mm to 10 mm
- Wire netting upstream of catalyst

Remedies

- Catalyst with 0.4% SO_2 – SO_3 conversion
- Ammonia injection upstream of economizer
- Enameled plates in air preheater
- Soot blowing in air preheater
- Ammonia slip < 3 ppm